

CLAIMS

We claim:

1. An article cleaning apparatus comprising:
an air management mechanism;
5 a cleaning basket assembly;
a fluid processing mechanism comprising comprises an ultrafiltration filter
having a pore size of about 0.01 microns to about 0.2 microns; and
a controller configured to control a cleaning process using a solvent based
cleaning fluid,
10 wherein
said air management mechanism is in communication with said cleaning
basket assembly and with said fluid processing mechanism;
said cleaning basket assembly is in communication with said fluid processing
mechanism; and
15 said controller is in communication with said air management mechanism,
with said cleaning basket assembly, and with said fluid processing mechanism.
2. The apparatus of claim 1, wherein said fluid processing mechanism 4
further comprises a flushing device operable to reverse the flow of solvent based
20 cleaning fluid through said ultrafiltration filter.
3. The apparatus of claim 1, wherein said ultrafiltration filter is operable to
only allow materials having a molecular weight of less than about 100,000 daltons to
pass through.
4. The apparatus of claim 1, wherein said ultrafiltration filter comprises an
25 ultrafiltration membrane.
5. The apparatus of claim 4, wherein said ultrafiltration membrane is in a
spiral wound configuration.

6. The apparatus of claim 1, wherein the article cleaning apparatus uses a solvent based cleaning solvent comprising a siloxane.

7. The apparatus of claim 1, wherein said fluid processing mechanism 4 further comprises a particulate filter in communication with said cleaning basket assembly and said ultrafiltration filter.

8. The apparatus of claim 7, wherein said particulate filter has a mesh size in a range from about 0.5 microns to about 50 microns.

9. The apparatus of claim 7, wherein said particulate filter is a cartridge filter fabricated from materials selected from the group consisting of thermoplastics, polyethylene, polypropylene, polyester, aluminum, stainless steel, metallic mesh, sintered metal, ceramic, diatomeaceous earth, and any combination thereof.

10. The apparatus of claim 1, wherein said fluid processing mechanism further comprises a mechanical filter in communication with said cleaning basket assembly 2 and said ultrafiltration filter.

11. The apparatus of claim 10, wherein said mechanical filter has a mesh size in a range from about 50 microns to about 1000 microns.

12. The apparatus of claim 1, wherein said fluid processing mechanism further comprises a mechanical filter and a particulate filter, wherein said mechanical filter is in communication with said cleaning basket assembly and said particulate filter, and said particulate filter is in communication with said mechanical filter and said ultrafiltration filter.

13. An article cleaning apparatus comprising:
an air management mechanism;
a cleaning basket assembly;

a fluid processing mechanism comprising a working fluid device, a fluid regeneration device, and a clean fluid device; and
a controller configured to control a cleaning process using a solvent based cleaning fluid or a water based cleaning fluid,

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wherein

said air management mechanism is in communication with said cleaning basket assembly, with said working fluid device, and with said clean fluid device;

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said cleaning basket assembly is in communication with said fluid working fluid device and with said clean fluid device; and

said controller is in communication with said air management mechanism, with said cleaning basket assembly, with said fluid working fluid device, with said fluid regeneration device, and with said clean fluid device, and

wherein

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said fluid regeneration device comprises an ultrafiltration filter having a pore size of about 0.01 microns to about 0.2 microns.

14. The apparatus of claim 13, wherein said fluid regeneration device further comprises a flushing device wherein said flushing device is operable to reverse the flow solvent based cleaning fluid through said ultrafiltration filter.

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15. The apparatus of claim 13, wherein said ultrafiltration filter is operable to only allow about materials having a molecular weight of less than about 100,000 daltons to pass through.

16. The apparatus of claim 13, wherein said ultrafiltration filter comprises an ultrafiltration membrane.

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17. The apparatus of claim 16, wherein said ultrafiltration membrane is in a spiral wound configuration.

18. The apparatus of claim 13, wherein the article cleaning apparatus uses a solvent based cleaning solvent comprising a siloxane.

19. The apparatus of claim 13, wherein said fluid regeneration device further comprises a particulate filter in communication with said cleaning basket assembly and said ultrafiltration filter.

20. The apparatus of claim 19, wherein said particulate filter has a mesh size in a range from about 0.5 microns to about 50 microns.

21. The apparatus of claim 19, wherein said particulate filter is a cartridge filter fabricated from materials selected from the group consisting of thermoplastics, polyethylene, polypropylene, polyester, aluminum, stainless steel, metallic mesh, sintered metal, ceramic, diatomeaceous earth, and any combination thereof.

22. The apparatus of claim 13, wherein said fluid regeneration device further comprises a mechanical filter in communication with said cleaning basket assembly and said ultrafiltration filter.

23. The apparatus of claim 22, wherein said mechanical filter has a mesh size in a range from about 50 microns to about microns.

24. The apparatus of claim 13, wherein said fluid regeneration device further comprises a mechanical filter and a particulate filter, wherein said mechanical filter is in communication with said cleaning basket assembly and the particulate filter and said particulate filter is in communication with said mechanical filter and said ultrafiltration filter.

25. The apparatus of claim 13, wherein the fluid regeneration device comprises a regeneration cartridge comprising said ultrafiltration filter.

26. The apparatus of claim 25, wherein said regeneration cartridge further comprises a particulate filter in communication with a water adsorption media and a

cleaning fluid regeneration adsorption media in communication with said water adsorption media.

27. The apparatus of claim 25, wherein said regeneration cartridge further comprises a water adsorption media coupled to a cleaning fluid regeneration
5 adsorption media.

28. The apparatus of claim 25, wherein said regeneration cartridge further comprises a cleaning fluid regeneration adsorption media, wherein said cleaning fluid regeneration adsorption media is fabricated from materials that are selected from the group consisting of activated charcoal, carbon, calcined clay, Kaolinite, adsorption
10 resins, carbonaceous type resins, silica gels, alumina in acid form, alumina in base form, alumina in neutral form, zeolites, molecular sieves, and any combination thereof.

29. The apparatus of claim 25, wherein said regeneration cartridge further comprises a particulate filter coupled to a mechanical filter, a water adsorption media
15 coupled to said mechanical filter, a cleaning fluid regeneration adsorption media coupled to said water adsorption media.

30. The apparatus of claim 25, wherein said regeneration cartridge comprises a mechanical filter, wherein said mechanical filter has a mesh size in a range from about 50 microns to about 1000 microns.

20 31. The apparatus of claim 25, wherein said regeneration cartridge comprises a particulate filter, wherein said particulate filter has a mesh size in a range from about 0.5 microns to about 50 microns.

32. The apparatus of claim 25, wherein said regeneration cartridge comprises a particulate filter, wherein said particulate filter comprises a cartridge
25 filter fabricated from materials selected from the group consisting of thermoplastics,

polyethylene, polypropylene, polyester, aluminum, stainless steel, metallic mesh, sintered metal, ceramic, diatomeaceous earth, and any combination thereof.

33. A method for performing a solvent based cleaning process using an article cleaning apparatus comprising:

- 5 passing a solvent based cleaning fluid through an ultrafiltration filter having a
 having a pore size of about 0.01 microns to about 0.2 microns.

34. The method of claim 33, wherein the ultrafiltration filter is operable to only allow materials having a molecular weight of less than about 100,000 daltons to pass through.

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